Lesson 1 Homework Practice

Constant Rate of Change

Determine whether the relationship between the two quantities described in each table is linear. If so, find the constant rate of change. If not, explain your reasoning.

1. Fabric Needed for Costumes

Number of Costumes	2	4	6	8
Fabric (yd)	7	14	21	28

Yes; the rate of change between the amount of fabric and number of costumes is a constant $3\frac{1}{2}$ yd fabric per costume.
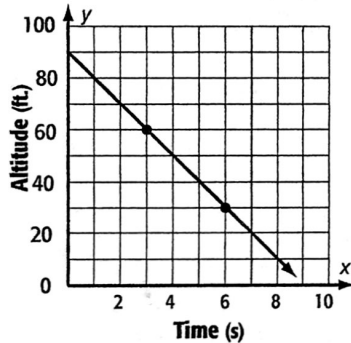
2. Distance Traveled on Bike Trip

Day	1	2	3	4
Distance(mi)	21.8	43.6	68.8	90.6

No; the rate of change from day 1 to day 2, $\frac{43.6 - 21.8}{2 - 1}$ or 21.8 mi per day is not the same as the rate of fabric change from day 2 to day 3, $\frac{68.8 - 43.6}{3 - 2}$ or 25.2 mi per day, so the rate of change is not constant.

For Exercises 3 and 4, refer to the graphs below.

3.

Hawk Diving Toward Prey

4.

Book Sales

a. Find the constant rate of change and interpret its meaning. **−10 ft/s; a descent of 10 ft for every second diving toward the prey**

b. Determine whether a proportional linear relationship exists between the two quantities shown in the graph. Explain your reasoning. **No; the ratios of altitude to time for 3 and 6 seconds are $\frac{60}{3}$ or 20 and $\frac{30}{6}$ or 5, respectively. Since these ratios are not the same, the relationship is not proportional.**
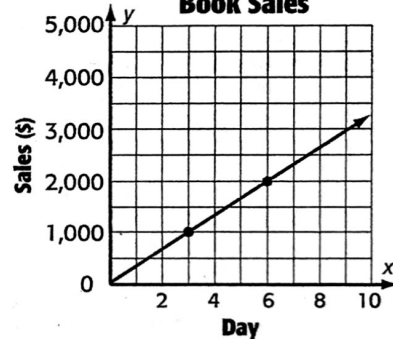
a. Find the constant rate of change and interpret its meaning. **$333.33/day; an increase in sales of $333.33 each day**

b. Determine whether a proportional linear relationship exists between the two quantities shown in the graph. Explain your reasoning. **Yes; the ratio of sales to day is a constant $333.33 per day, so the relationship is proportional.**
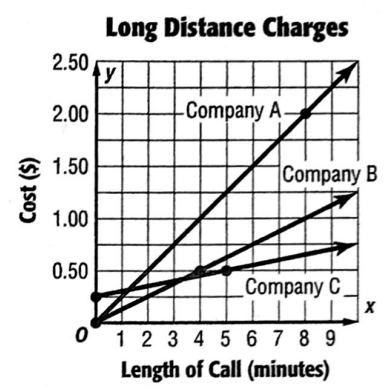
Lesson 1 Problem-Solving Practice

Constant Rate of Change

FLOWERS For Exercises 1 and 2, use the graph that shows the depth of the water in a vase of flowers over 8 days.
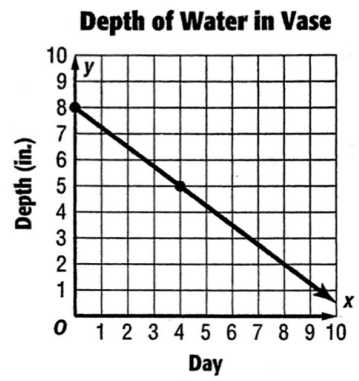
LONG DISTANCE For Exercises 3–6, use the graph that compares the costs of long distance phone calls with three different companies.

Depth of Water in Vase

Long Distance Charges

1. Find the rate of change for the line. $-\dfrac{3}{4}$	2. Interpret the difference between depth in inches and the day as a rate of change. **The depth of the water is decreasing by $\dfrac{3}{4}$ inch each day.**
3. Interpret the difference between the cost in dollars and the length in minutes for Company A as a rate of change. **0.25; The cost of a call with Company A increases $0.25 each min.**	4. Interpret the difference between the cost in dollars and the length in minutes for Company B as a rate of change. **0.125; The cost of a call with Company B increases $0.125 each min.**
5. Interpret the difference between the cost in dollars and the length in minutes for Company C as a rate of change. **0.05; The cost of a call with Company C increases $0.05 each min.**	6. Which company charges the least for each additional minute? Explain your reasoning. **Company C; Company C charges $0.05 for each additional min, while Companies A and B charge $0.25 and $0.125, respectively.**

Course 3 • Chapter 3 Equations in Two Variables

Lesson 2 Homework Practice

Slope

Find the slope of each line.

1. $\dfrac{2}{5}$

2. -1

3. $\dfrac{5}{2}$
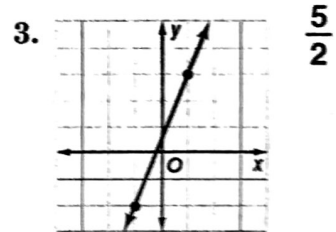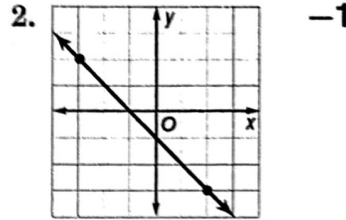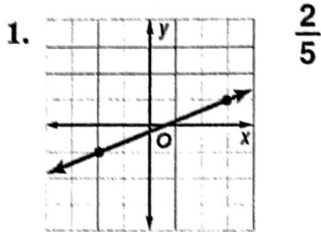
The points given in each table lie on a line. Find the slope of the line. Then graph the line.

4.

x	−1	1	3	5
y	−2	0	2	4

1

5.

x	−2	3	8	13
y	−2	−1	0	1

$\dfrac{1}{5}$

6.

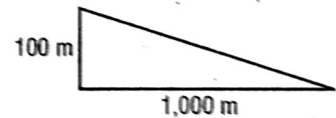| x	−1	2	5	8
y	3	−1	−5	−9

$-\dfrac{4}{3}$
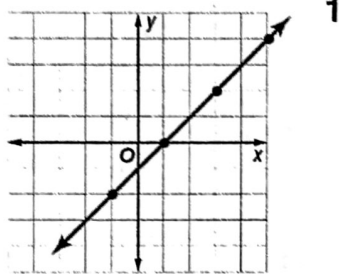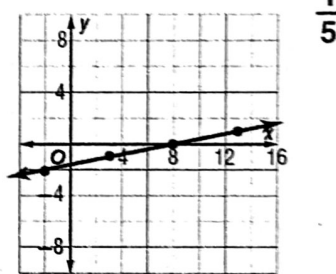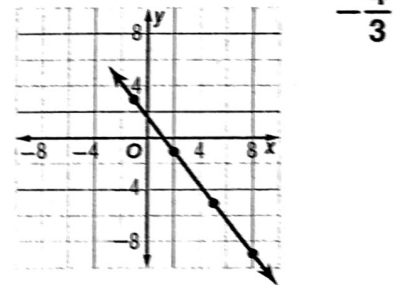
7. HOMES Find the slope of the roof of a home that rises 8 feet for every horizontal change of 24 feet.
$\dfrac{1}{3}$

8. MOUNTAINS Find the slope of a mountain that descends 100 meters for every horizontal distance of 1,000 meters.
$-\dfrac{1}{10}$

Find the slope of the line that passes through each pair of points.

9. $A(1, 3), B(4, 7)$ $\dfrac{4}{3}$

10. $C(3, 5), D(2, 6)$ -1

11. $E(4, 0), F(5, 5)$ 5

12. SNOWFALL Use the graph at the right. It shows the depth in feet of snow after each two-hour period during a snowstorm.

a. Find the slope of the line. $\dfrac{1}{4}$

b. Does the graph show a constant rate of change? Explain.
**Yes; the slope is the same between each pair of points.**

c. If the graph is extended to the right, could you expect the slope to remain constant? Explain. **No; the storm would eventually stop.**

Snowfall

Course 3 • Chapter 3 Equations in Two Variables
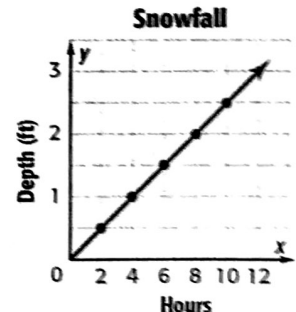
Lesson 2 Problem-Solving Practice

Slope

1. **MOVIES** By the end of its first week, a movie had grossed $2.3 million. By the end of its sixth week, it had grossed $6.8 million. Graph the data with the week on the horizontal axis and the revenue on the vertical axis, and draw a line through the points. Then find and interpret the slope of the line.
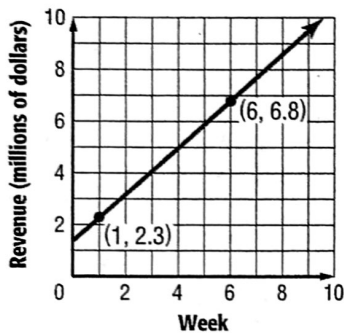

0.9; The film earned an average of $0.9 million dollars per week for weeks 2–6.

2. **BASKETBALL** After Game 1, Felicia had scored 14 points. After Game 5, she had scored a total of 82 points for the season. After Game 10, she had scored 129 points. Graph the data with the game number on the horizontal axis and the number of points on the vertical axis. Connect the points using two different line segments.
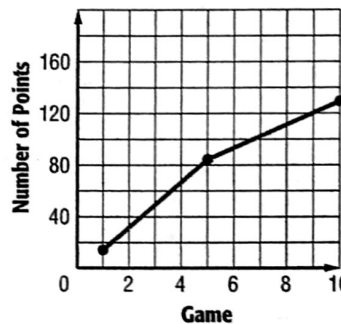
3. **BASKETBALL** Find the slope of each line segment in your graph from Exercise 2 and interpret it. Which part of the graph shows the greater rate of change? Explain. **17; Felicia scored an average of 17 points per game for Games 2–5; 9.4; she scored an average of 9.4 points per game for Games 6–10; the first part; it has a greater slope.**

4. **GEOMETRY** The figure shows triangle ABC plotted on a coordinate plane. Explain how to find the slope of the line through points A and B. Then find the slope.
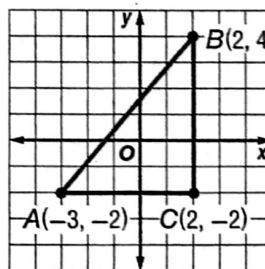

Use the slope formula; $\frac{6}{5}$.

5. Use the figure in Exercise 4. What is the slope of the line through points A and C? How do you know?
0; The line is horizontal.

6. Use the figure in Exercise 4. What is the slope of the line through points B and C? How do you know?
undefined; you cannot divide by 0.

Lesson 3 Homework Practice

Equations in y = mx Form

1. **ADVERTISING** The number of vehicles a dealership sells varies directly with the money spent on advertising. How many vehicles does the dealership sell for each $1,000 spent on advertising?   **8 vehicles**

Dealership Sales
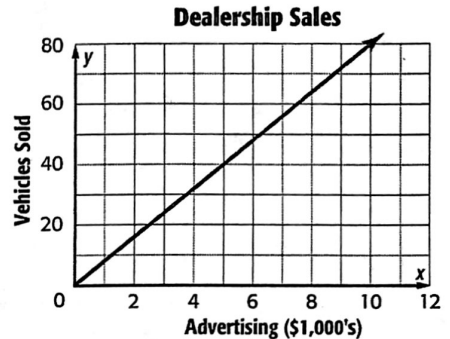
2. **SNOWMOBILES** Bruce rents snowmobiles to tourists. He charges $135 for 4 hours and $202.50 for 6 hours. What is the hourly rate Bruce charges to rent a snowmobile?   **$33.75**

3. **SOLAR ENERGY** The power absorbed by a solar panel varies directly with its area. If an 8 square meter panel absorbs 8,160 watts of power, how much power does a 12 square meter solar panel absorb?   **12,240 watts**

4. **INSECT CONTROL** Mr. Malone used 40 pounds of insecticide to cover 1,760 square feet of lawn and 60 pounds to cover an additional 2,640 square feet. How many pounds of insecticide would Mr. Malone need to cover his whole lawn of 4,480 square feet?   **about 101.8 lb**

Determine whether each linear function is a direct variation. If so, state the constant of variation.

5.

Volume, x	2	4	6	8
Mass, y	10	20	30	40

yes; 5

6.

Gallons, x	5	10	15	20
Miles, y	95	190	285	380

yes; 19

7.

Time, x	8	9	10	11
Temp, y	68	71	74	77

no

8.

| Age, x	3	6	9	12
Height, y	28	40	52	64

no

ALGEBRA If y varies directly with x, write an equation for the direct variation. Then find each value.

9. If $y = -5$ when $x = 2$, find y when $x = 8$. $y = -\dfrac{5}{2}x; y = -20$

10. Find y when $x = 1$, if $y = 3$ when $x = 2$. $y = \dfrac{3}{2}x; y = \dfrac{3}{2}$

11. If $y = -7$ when $x = -21$, what is the value of x when $y = 9$? $y = \dfrac{1}{3}x; x = 27$

12. Find x when $y = 18$, if $y = 5$ when $x = 4$. $y = \dfrac{5}{4}x; x = 14\dfrac{2}{5}$

Lesson 3 Problem-Solving Practice

Equations in y = mx Form

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1. JOBS The amount Candice earns varies directly with the number of magazines she sells. How much does Candice earn for each magazine sale?

Earnings ($) vs Magazines Sold
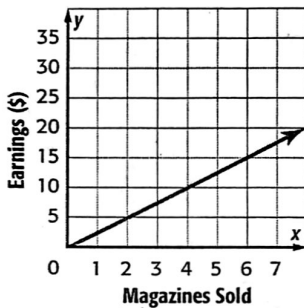
$2.50 per magazine

2. MANUFACTURING The number of cars built varies directly as the number of hours the production line operates. What is the ratio of cars built to hours of production?

Number of Cars Built vs Production Hours
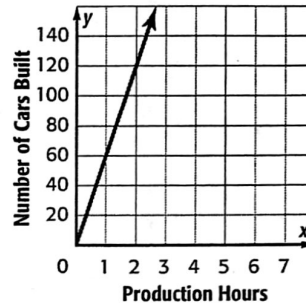
60 cars built per hour

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3. DRIVING A car drives 283.5 miles in 4.5 hours. Assuming that the distance traveled varies directly with the time traveled, how far will the car travel in 7 hours?

441 miles

4. MEASUREMENT The number of kilograms that an object weighs varies directly as the number of pounds. If an object that weighs 45 kilograms weighs about 100 pounds, about how many kilograms is an object that weighs 70 pounds?

about 31.5 kilograms

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5. RECORDING The amount of cable that is wound on a spool varies directly with the amount of time that passes. Determine the speed at which the cable moves.

Cable Length (in.) vs Time (s)
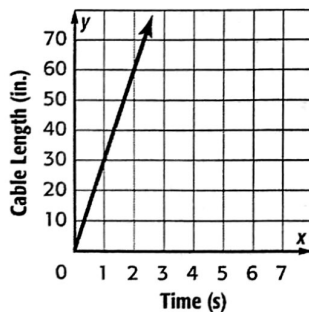
30 inches per second

6. GEOMETRY The width of a rectangle varies directly as its length. What is the perimeter of a rectangle that is 15 inches long? **42 in.**

5 in.

12.5 in.